System Fundamentals

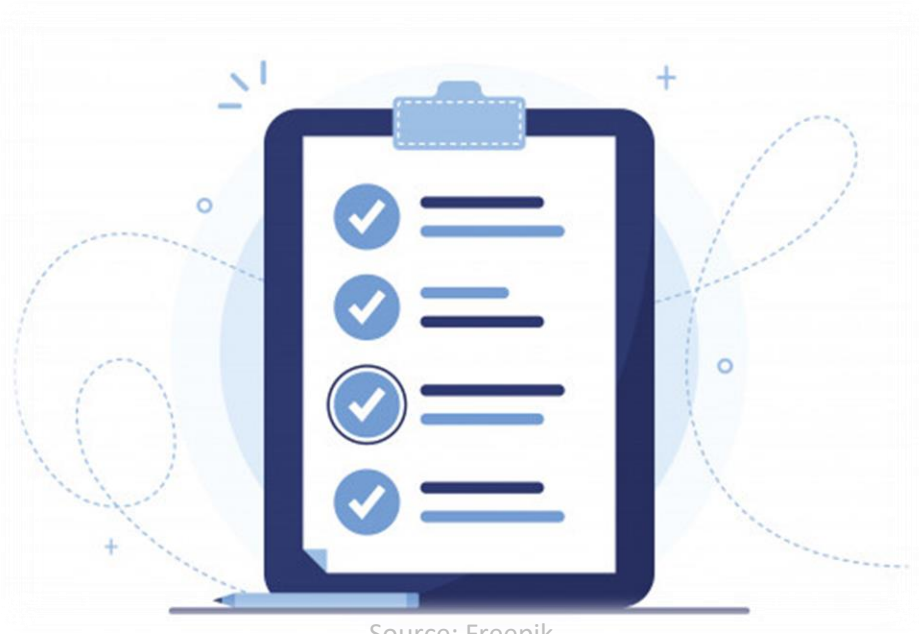
Virtualization and its Components

Feb 2021

Agenda

In today's session, you will learn about:

- Compute Virtualization
- Virtual Machines
- Application Virtualization
- Desktop Virtualization



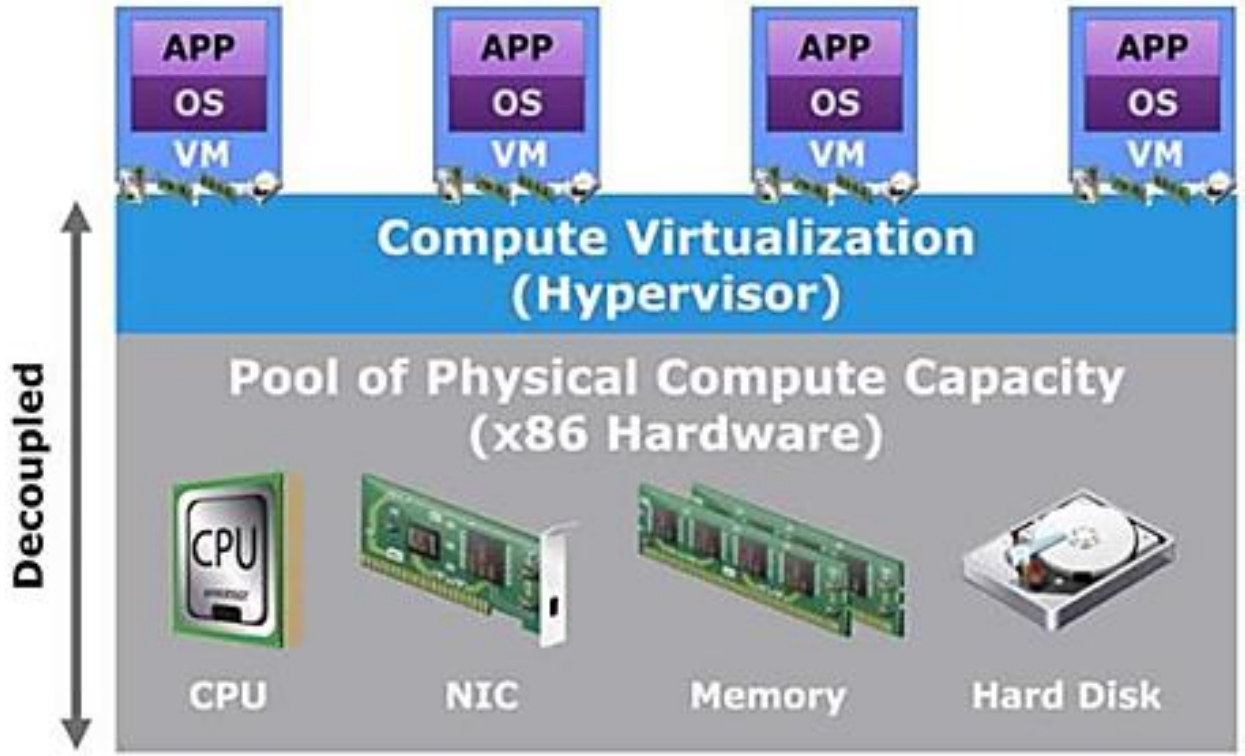
Source: Freepik

What is **Virtualization?**

Created by fae frey
from Noun Project

Compute Virtualization

- Compute virtualization is a technique of abstracting the physical hardware of a compute system from the operating system (OS) and applications.



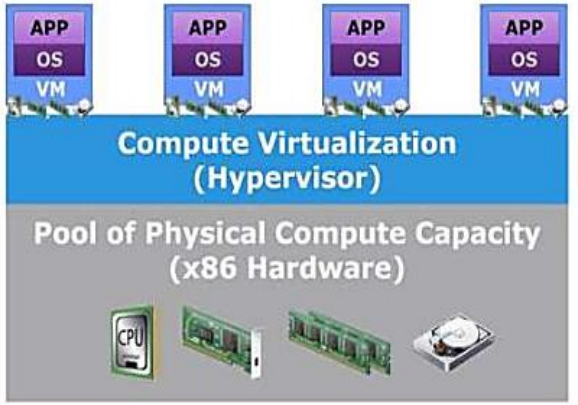
Need for Compute Virtualization

Before Virtualization

- IT silos and underutilized resources
- Inflexible and expensive
- Management inefficiencies
- Risk of downtime

After Virtualization

- Server consolidation and improved resource utilization
- Flexible infrastructure at a lower cost
- Increased management efficiencies
- Increased availability and improved business continuity



Name of the Activity

Fastest Finger First

Instructions

Mode: **In-session**

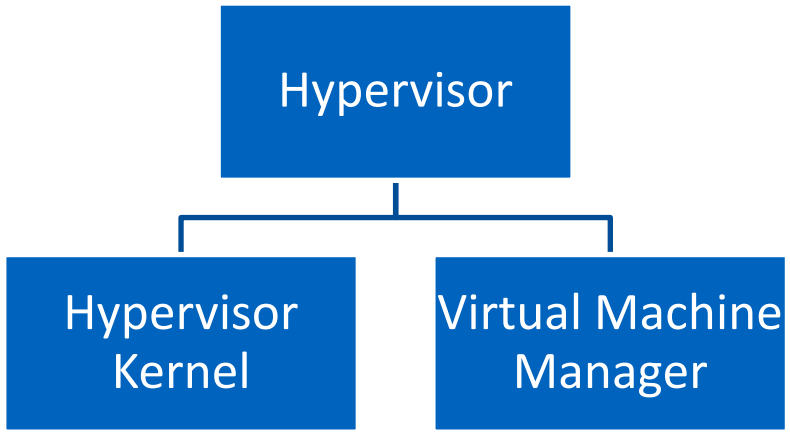
Duration: **5 minutes**

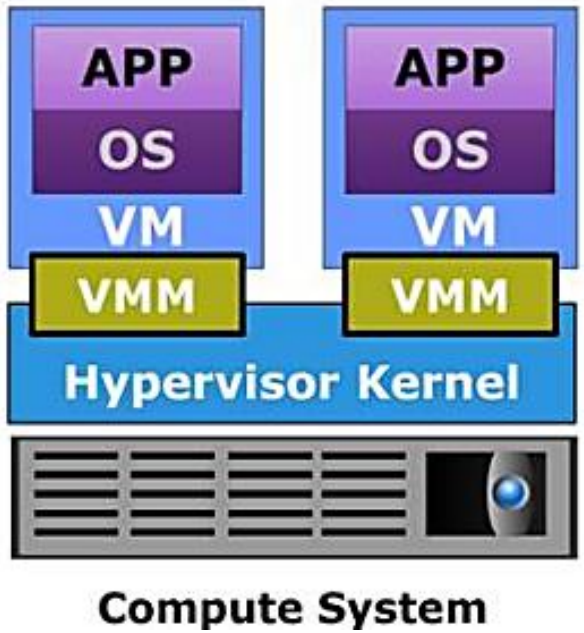
Materials Required: **None**

What changes did Compute Virtualization bring about?

Hypervisor

- Hypervisor is compute virtualization software that is installed on a compute system.
- It provides a virtualization layer that abstracts the processor, memory, network, and storage of the compute system and enables the creation of multiple virtual machines.
- Components of a Hypervisor





Types of Hypervisors

Bare-metal Hypervisor	Hosted Hypervisor
A bare-metal hypervisor is directly installed on the physical compute hardware in the same way as an OS.	A hosted hypervisor is installed as an application on an operating system.
It has direct access to the hardware resources of the compute system and is therefore more efficient than a hosted hypervisor.	The hosted hypervisor does not have direct access to the hardware, and all requests pass through the OS running on the physical compute system.
A bare-metal hypervisor is designed for enterprise data centers and third platform infrastructure.	A hosted hypervisor is more suitable for development, testing, and training purposes.

Name of the Activity

Face Off

Instructions

Mode: **In-session**

Duration: **5 minutes**

Materials Required: **None**

Bare-metal Hypervisor
v/s
Hosted Hypervisor

What is **Virtual Machine?**

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from Noun Project

Virtual Machine

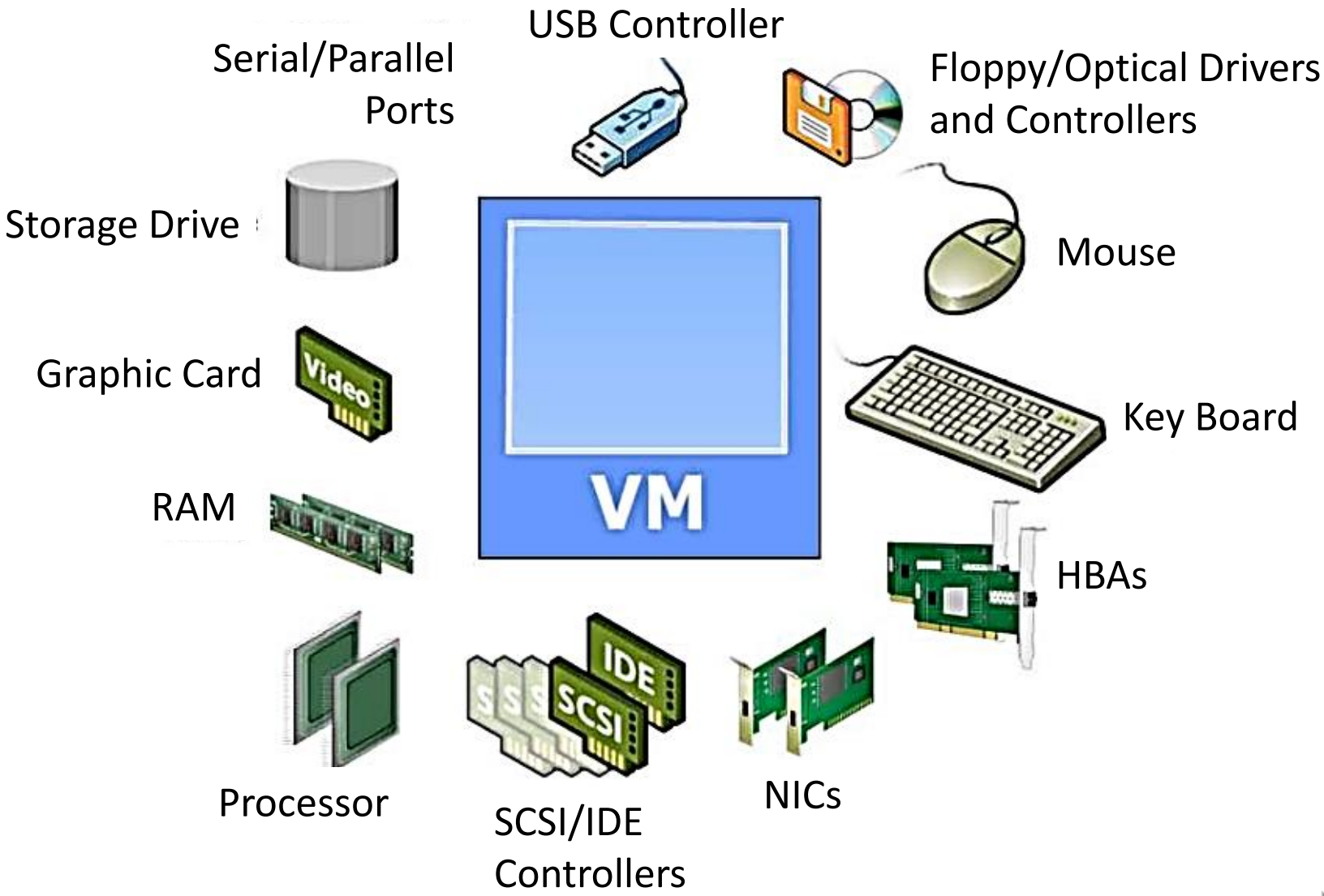
- Logical compute system with virtual hardware on which a supported guest OS and its applications run
- Created by a hypervisor installed on a physical compute system
- VM appears as a physical compute system

Virtual Machine

- Operating system
- VMware Tools

  - CPU and memory
  - Network adapters
  - Disk controllers
  - Parallel and serial ports

VM Hardware


USB Controller
Serial/Parallel Ports
Floppy/Optical Drivers and Controllers
Storage Drive
Mouse
Graphic Card
Video
Key Board
RAM
VM
HBAs
IDE
SCSI
Processor
SCSI/IDE Controllers
NICs

VM Files

Configuration file	• Stores information, such as VM name, BIOS information, guest OS type, memory size
Virtual disk file	• Stores the contents of the VM's disk drive
Memory state file	• Stores the memory contents of a VM in a suspended state
Snapshot file	• Stores the VM settings and virtual disk of a VM
Log file	• Keeps a log of the VM's activity and is used in troubleshooting

Name of the Activity

Who am I?

Instructions

Mode: **In-session**

Duration: **5 minutes**

Materials Required: **None**

Activity – Who am I?

- I store the contents of the VM's disk drive. **Virtual Disk File**
- I store the VM settings and virtual disk of a VM. **Snapshot File**
- My role is to keep a log of the VM's activity and is used in troubleshooting. **Log File**
- I store information, such as VM name, BIOS information, guest OS type, memory size. **Configuration File**
- I store the memory contents of a VM in a suspended state. **Memory State File**

Benefits of Virtual Machines

Physical Machines	Virtual Machines
Difficult to relocate	Easy to relocate
Difficult to manage	Easy to manage
Hardware has limitation	Legacy applications

Name of the Activity

Face Off

Instructions

Mode: **In-session**

Duration: **5 minutes**

Materials Required: **None**

Physical Machines
v/s
Virtual Machines

What are some other differences between **Virtual Machines and Physical Machines?**

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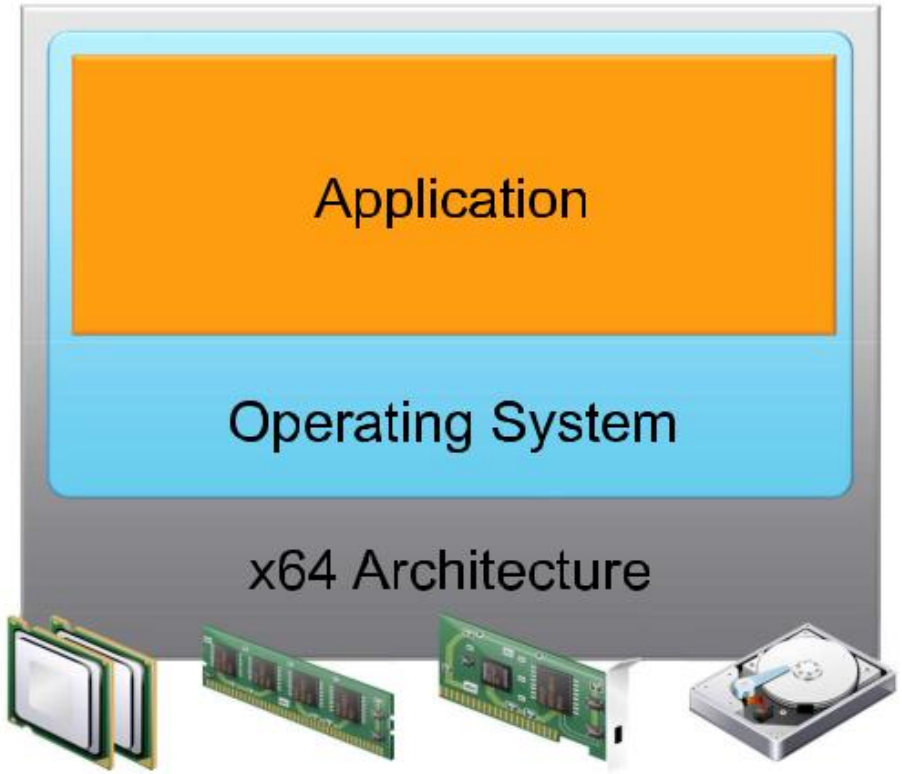
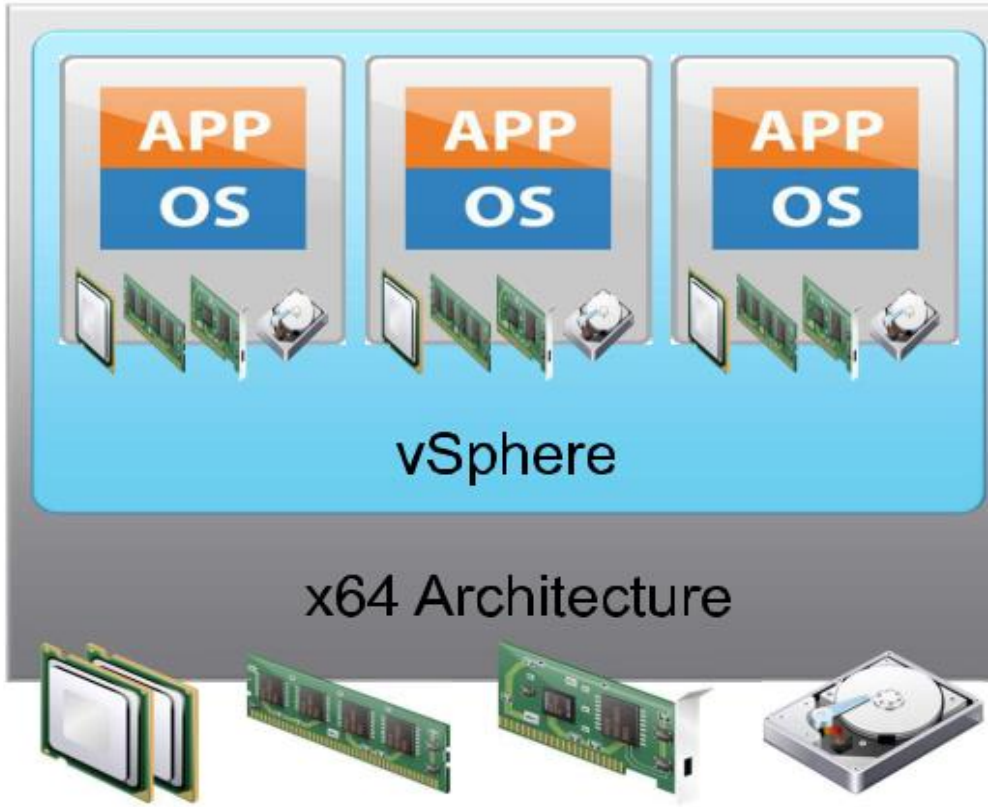
Physical and Virtual Architecture

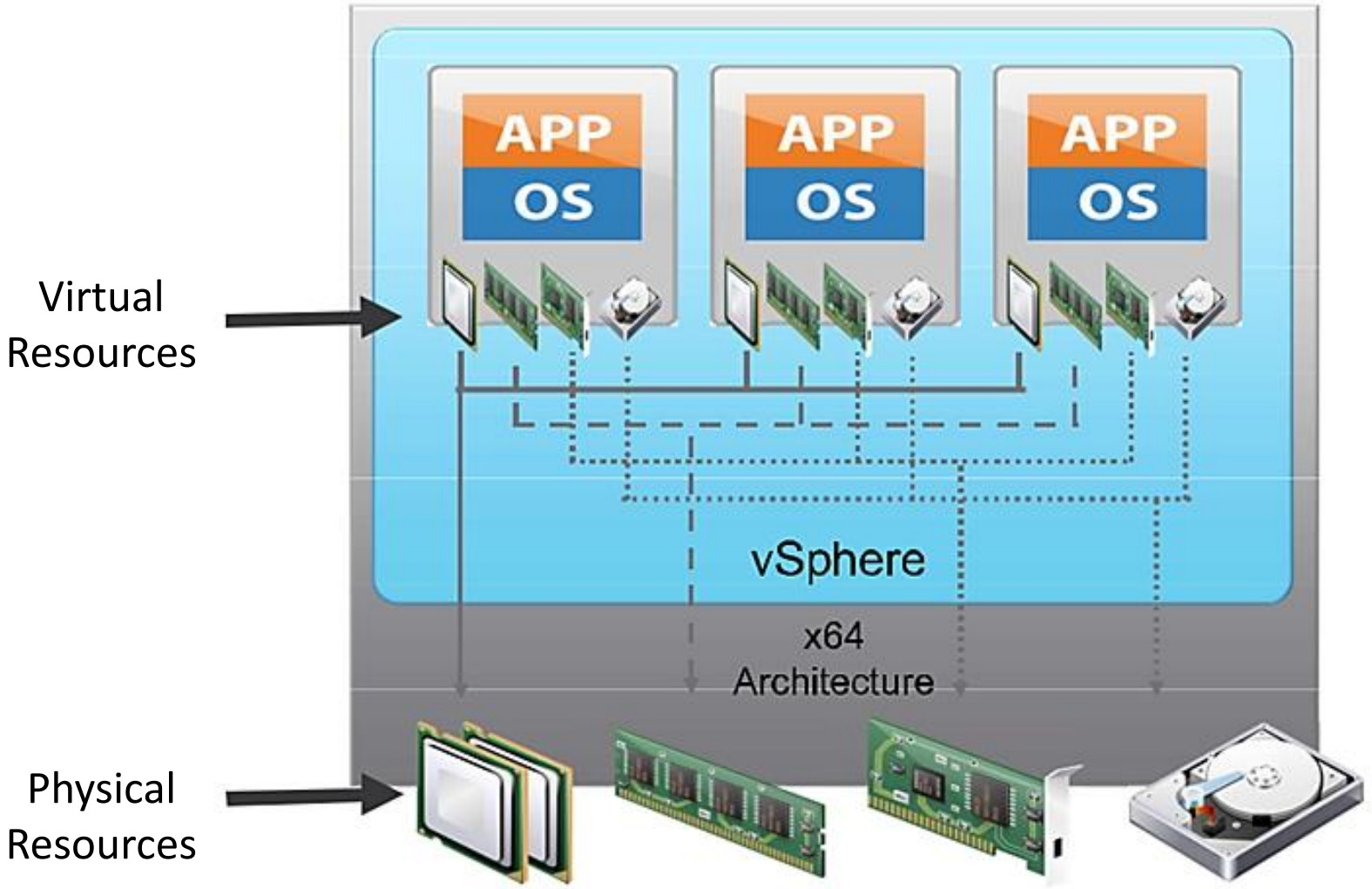
Physical Architecture



Virtual Architecture

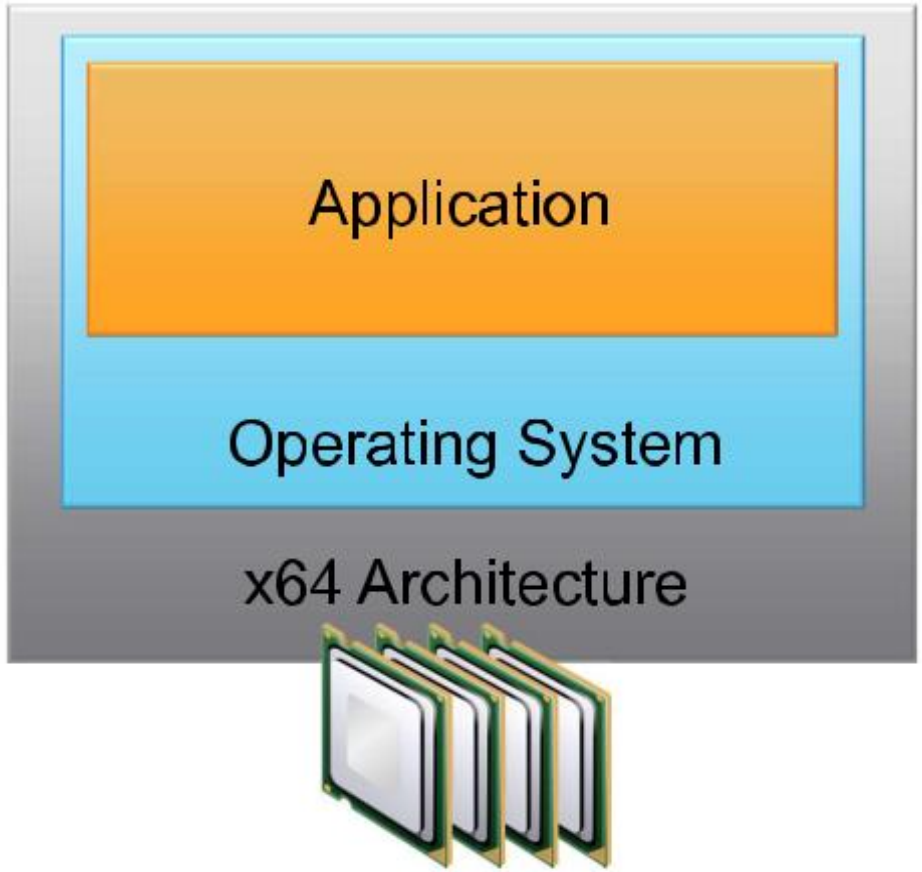


Physical Resource Sharing

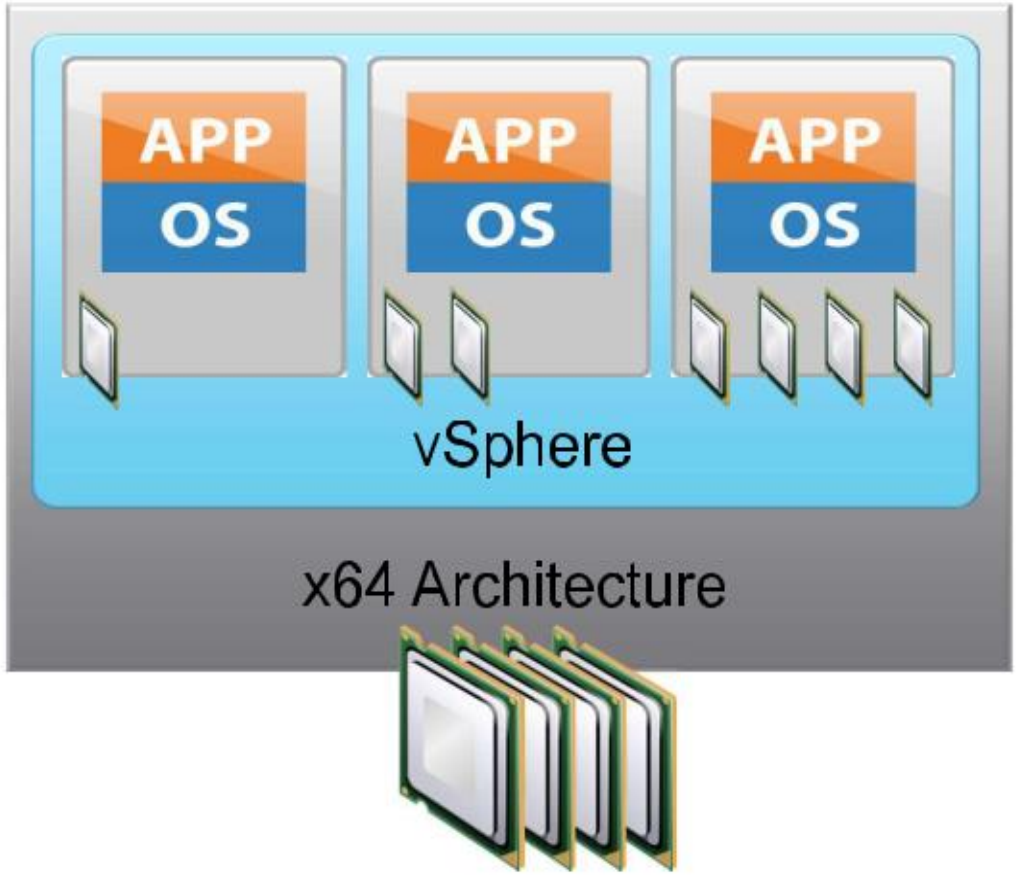


CPU Virtualization

Physical Architecture



Virtual Architecture



Name of the Activity

Taboo

Instructions

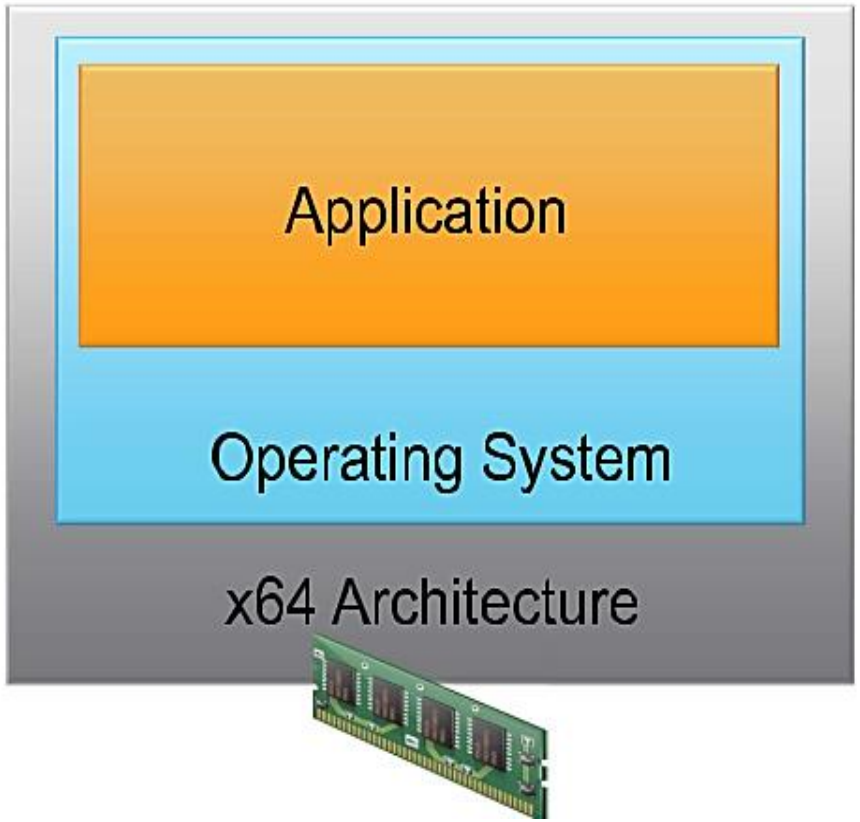
Mode: **In-session**

Duration: **5 minutes**

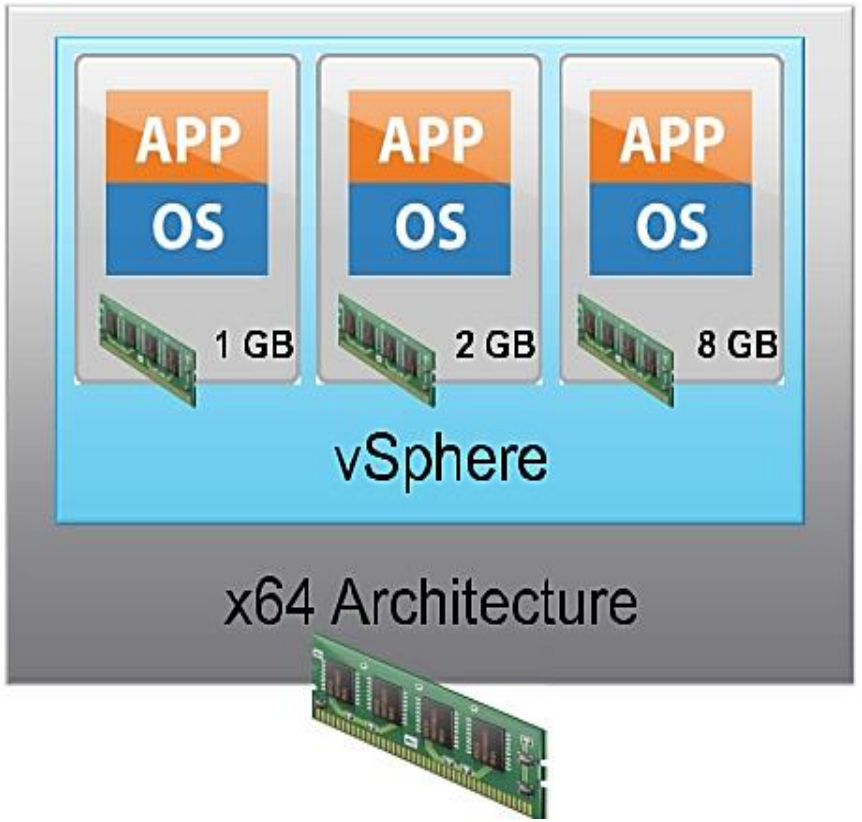
Materials Required: **None**

Physical and Virtual Host Memory Usage

Physical Architecture

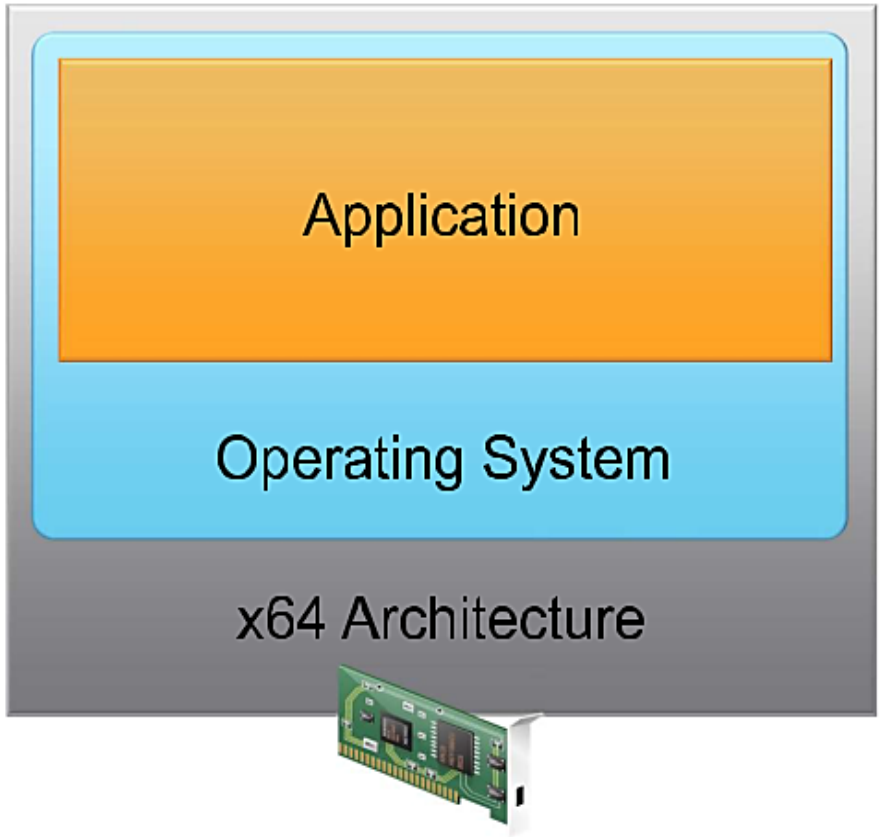


Virtual Architecture

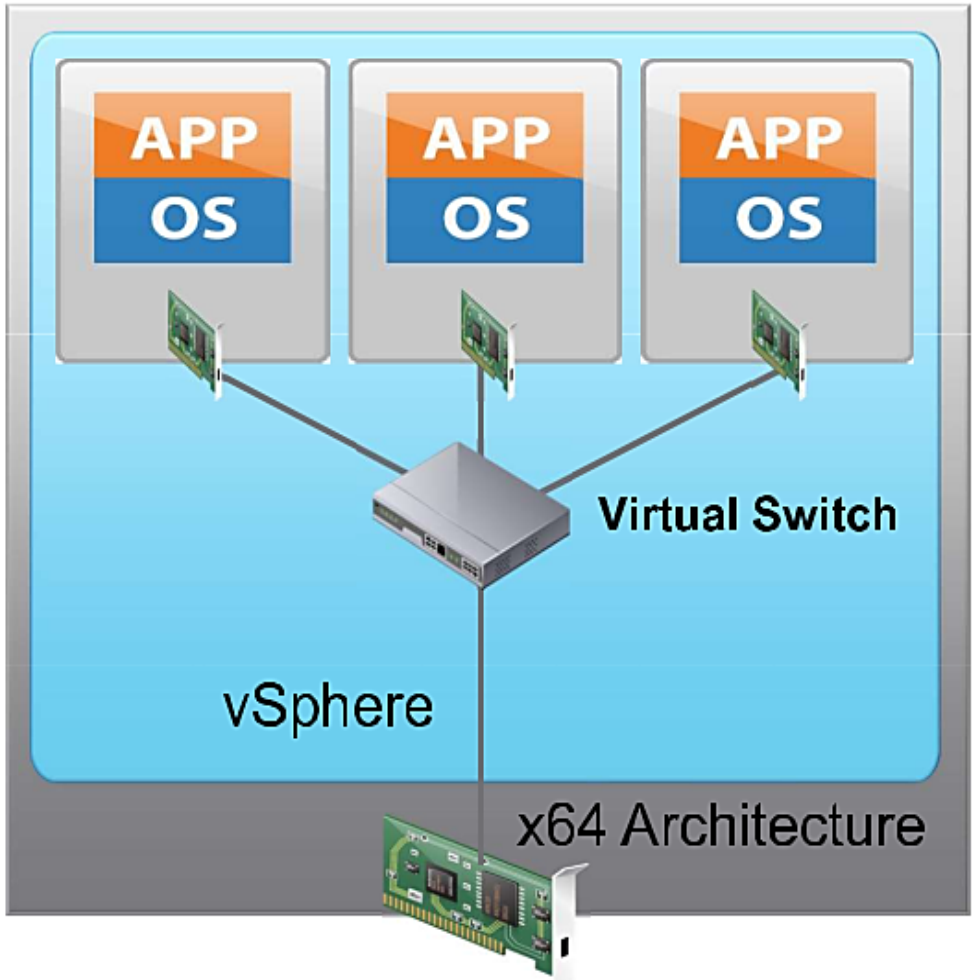


Physical and Virtual Networking

Physical Architecture



Virtual Architecture



Name of the Activity

Correct or Incorrect

Instructions

Mode: **In-session**

Duration: **5 minutes**

Materials Required: **None**

Knowledge Check – Correct or Incorrect

- Physical switches do not require a spanning tree protocol, because a single-tier networking topology is enforced. ✗
- Virtual memory is a well-known technique used in most general-purpose operating systems. ✓
- The virtualization layer runs instructions only when needed to make virtual machines operate as if they were running directly on a physical machine. ✓
- The hypervisor provides physical hardware resources dynamically to physical machines. ✗

Knowledge Check – Correct or Incorrect

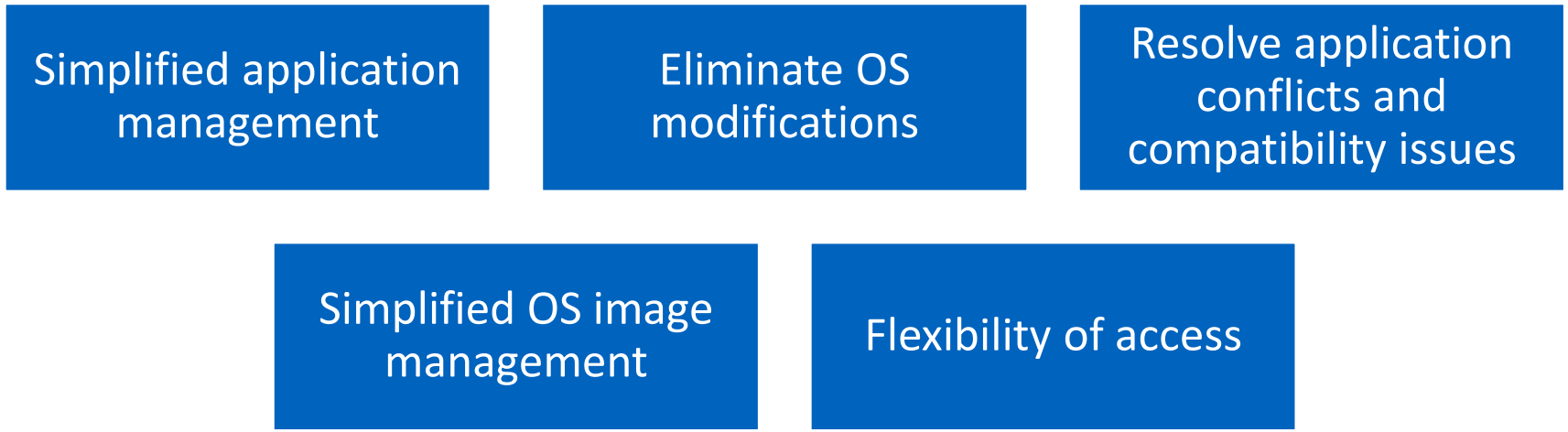
- When CPU contention occurs, the ESXi host time-slices the physical processors across all virtual machines so each virtual machine runs as if it had a specified number of virtual processors.

- Virtual machines share access to CPUs and are scheduled to run by the hypervisor.

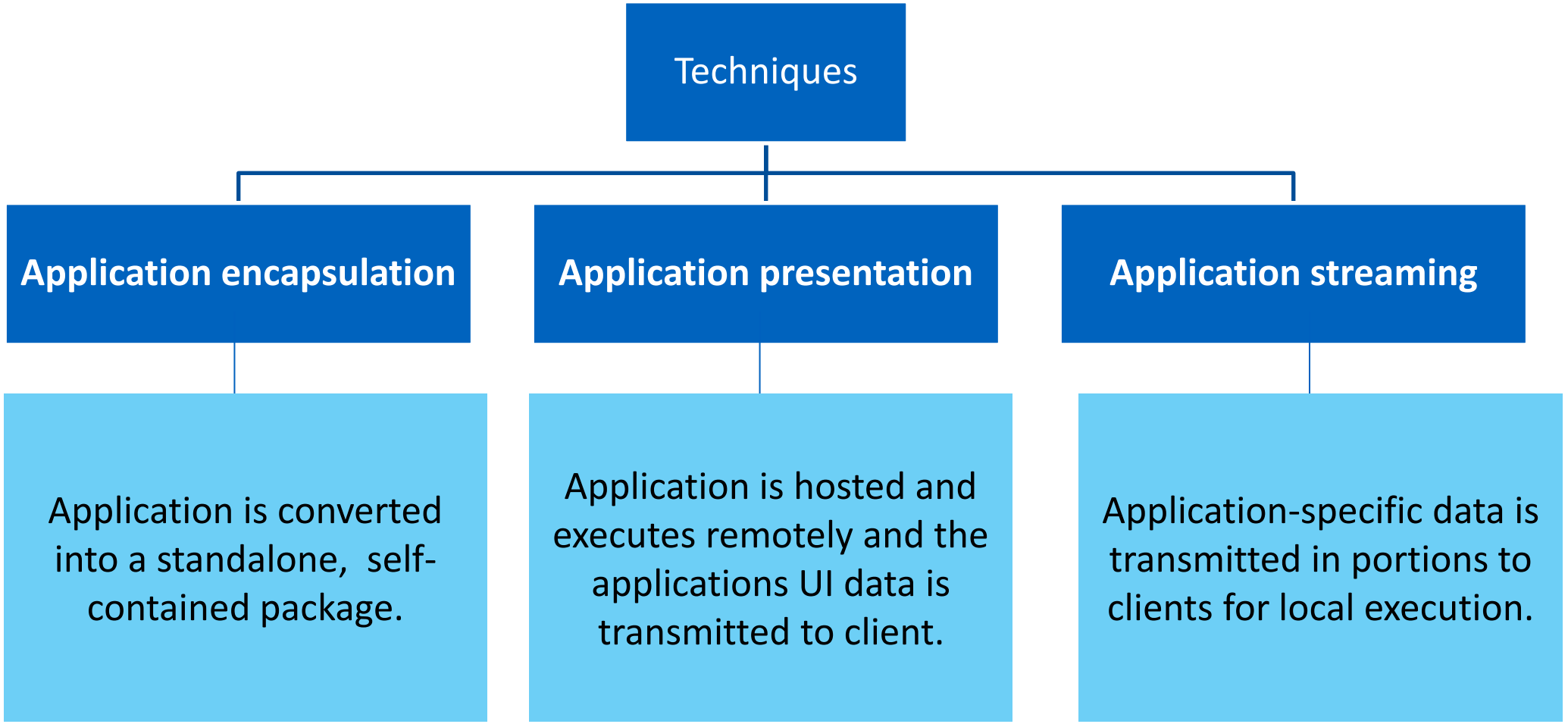
Application Virtualization

- Application virtualization is the technique of decoupling an application from the underlying computing platform (OS and hardware) in order to enable the application to be used on a compute system without installation.

- Benefits of Application Virtualization



Application Virtualization - Techniques



Name of the Activity

Identify the Technique

Instructions

Mode: **In-session**

Duration: **5 minutes**

Materials Required: **None**

Activity – Identify the Technique

- In this technique, an application is aggregated within a virtualized container, along with the assets, such as files, virtual registry, and class libraries that it requires for execution. **Application encapsulation**
- In this technique an application is deployed on a remote compute system, and is downloaded in portions to an end-point client device for local execution. **Application streaming**
- In this technique the process, of packaging or sequencing, converts an application into a standalone, self-contained executable package that can directly run on a compute system. **Application encapsulation**
- In this technique an application's user interface (UI) is separated from its execution. **Application presentation**
- In this technique application sessions are created in the remote compute system and a user connects to an individual session from a client by means of the software agent. **Application presentation**

What is **Desktop Virtualization?**

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from Noun Project

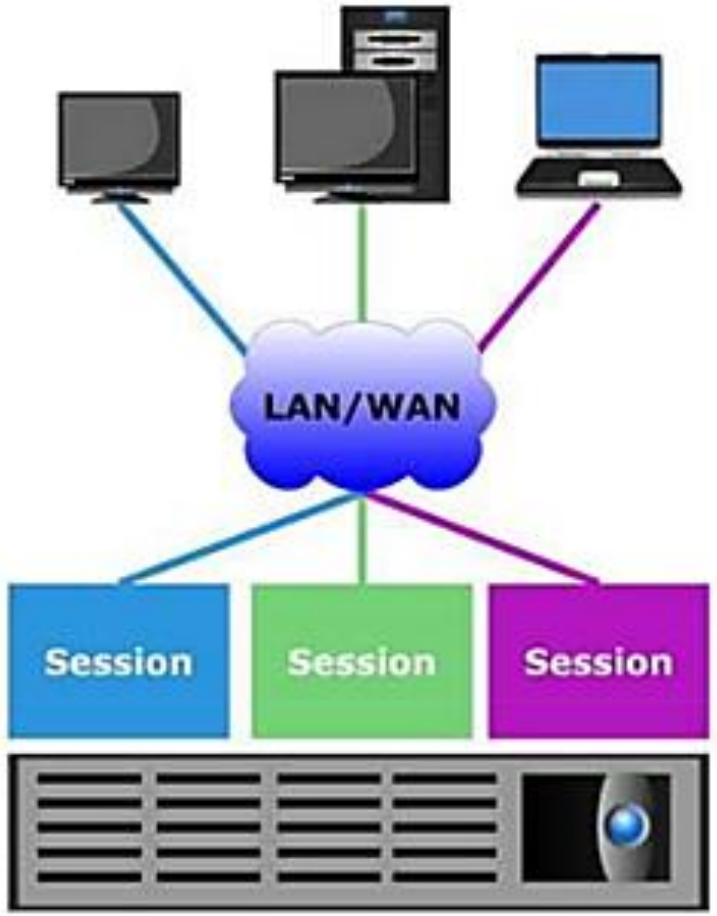
Desktop Virtualization

- Desktop virtualization decouples the OS, applications, and user state (profiles, data, and settings) from a physical compute system.

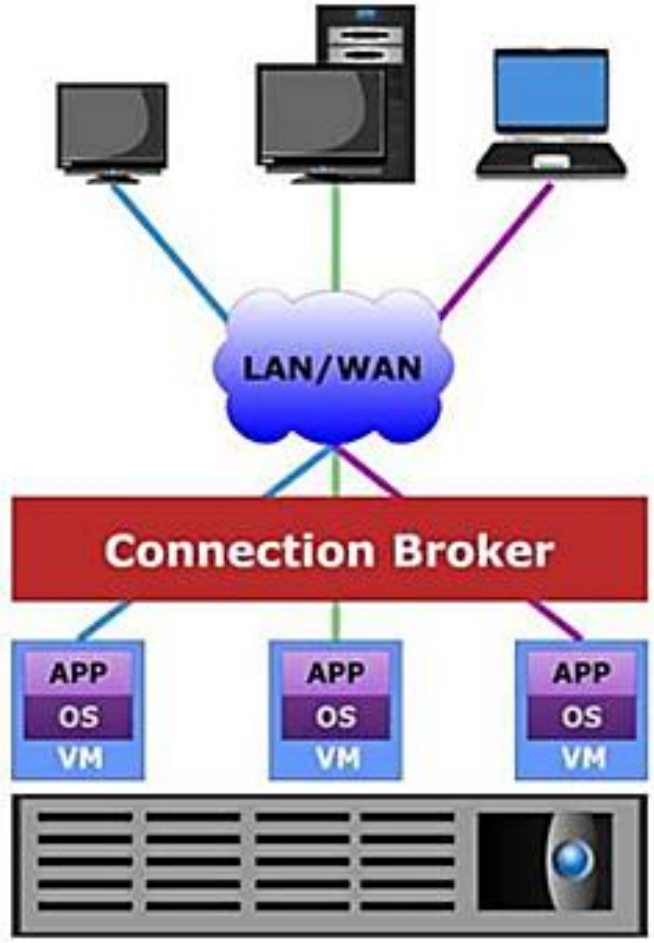
- Benefits of Desktop Virtualization
  - Simplified desktop infrastructure management
  - Improved data protection and compliance
  - Flexibility of access

Desktop Virtualization - Techniques

Remote Desktop Services



Virtual Desktop Infrastructure



Use Cases

Use Case	Description
Cloud Application Streaming	• Streaming applications from the cloud to various client services • Applications flexibly scale to meet growth in processing and storage needs • Applications can be delivered to devices on which they may run natively
Desktop as a Service	• Cloud service in which a VDI is hosted by a cloud service provider • Provider manages VDI and OS updates • Facilitates CAPEX and OPEX savings

Summary

In this session, you learnt about:

- Compute Virtualization
- Virtual Machines
- Application Virtualization
- Desktop Virtualization